

BOEM ENVIRONMENTAL STUDIES PROGRAM: Ongoing Studies

Region: Pacific OCS Region

Planning Area(s): All

Title: Renewable Energy *in situ* Power Cable Observation

BOEM Information Need(s) to be Addressed: The BOEM requires information concerning the level of impacts of electromagnetic field (EMF) on some marine species. Submarine transmission cables that power offshore oil platforms in the Pacific Region provide an opportunity to assess potential behavior and reaction of electromagnetic sensitive species to industry activities. The information will be applicable to all renewable energy power cable EMF considerations and will determine effectiveness of the commonly proposed mitigation of cable burial.

Total BOEM Cost: \$849,345 **Period of Performance:** FY 2011-2014

Conducting Organization: UC Santa Barbara

Principal Investigator: Dr. Milton Love

BOEM Contact: [Dr. Ann Bull](#)

Description:

Background: Renewable energy technologies, for the foreseeable future, will be focused on the generation of electricity. In all cases, we expect the individual devices will be interconnected with power cables to transmit the electricity to a platform or gathering site, and a single cable will connect the entire facility to shore. The power cable will transmit either alternating current or direct current. If the cable uses alternating current, it will generate both electric and magnetic fields. Proper shielding can block electric fields but not magnetic fields, which, in turn, can induce secondary electric fields. One of the potential impacts from energized power cables may be the local attraction or repulsion of electrosensitive species to the EMF. Several economically important species and as well as species' crucial habitat are in the immediate area of the existing cables. These species include, but are not limited to, the thresher shark, *Alopias macrourus*, the angel shark, *Squatina squatina*, and the longnose skate, *Raja rhina*, whose nursery ground is in the area nursery ground.

Submarine transmission cables that power offshore oil platforms in the Pacific Region provide a unique opportunity to assess potential behavior and reaction of electromagnetic sensitive species to industry activities. Knowledge gained from this study will be directly applicable to renewable energy projects in any OCS planning area. In the Pacific Region, there are two identical power cables, several miles long, located in the same corridor on the seafloor within the Santa Ynez Unit offshore Southern California Planning Area. Both of these cables use the industry standards of the power cables that will be used for connecting

devices (35 KV) within renewable energy installations. These cables were emplaced concurrently by the manufacturer. One cable is unenergized and disconnected from the grid, and one cable is energized. The energized power cable will be compared to the unenergized cable to determine potential impacts from electromagnetic fields while controlling for habitat contributed by the cable structure.

We will compare species densities among cable treatments to determine attraction/repulsion of electrosensitive species to energized and unenergized power cables. Data from the on- going EMF Synthesis Study NSL-PC-08-08 will determine the sampling width for the present cable biological survey transects. Data from the on-going Completion of Fish Assemblage Survey NSL PC-10-03 study will be used for habitat assemblage comparisons. Contemporaneously with the biological surveys, we will measure EMF emissions along both cables.

Objectives: The objectives of this study are to determine: 1) the strength, spatial extent, and variability of EMF's along both energized and unenergized cables; 2) whether electrosensitive species that are regional important such as sharks and rays respond (attraction/repulsion) to the EMF's of an *in situ* power transmission cable; 3) differences among fish communities associated with cable habitat and fish communities in natural habitats obtained from other BOEM- funded studies; and 4) the effectiveness of the commonly proposed mitigation of cable burial.

Methods: The evaluation would initially involve multiple cable surveys and EMF measurement, followed by a comparison of species at both cables to determine potential impacts from electromagnetic fields while controlling for habitat contributed by the cable structure.

- 1) Conduct fish surveys using the *Delta* submersible, a 4.6 m, 2-person vessel, operated by Delta Oceanographics of Oxnard, California along cable transects about two meters from the substrata. Conduct transects along both cables and in proximate habitat near the cables;
- 2) During all transects document (a) species; (b) estimated total length; (c) its distance and position relative to the cables and proximate habitat;
- 3) Measure EMF's using existing equipment;
- 4) Determine electrosensitive species response (attraction/repulsion) to the EMF's of an energized and unenergized, *in situ*, power transmission cable; and,
- 5) Using data from 4, analyze effectiveness of the commonly proposed mitigation of cable burial.

Current Status: Conducting fieldwork.

Final Report Due: 2015

Publications Completed: None

Affiliated WWW sites: None

Revised Date: April 18, 2012